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Marketing Ohio Tomatoes to Processors on Grades, 1930-1940

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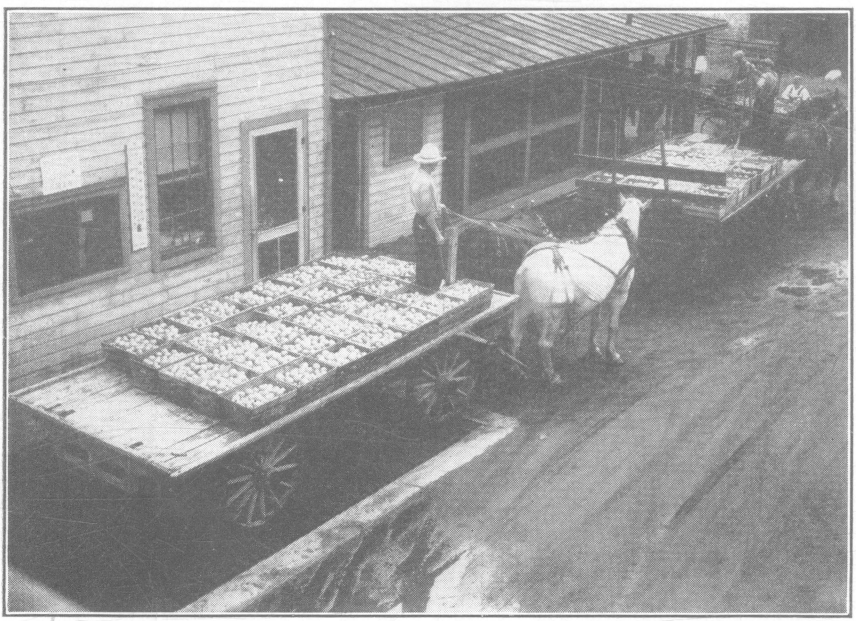

Tomatoes sold to processors are an important cash crop for many Ohio farmers.

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This publication is based largely on records furnished by the Federal-State Food Products Inspection Service in Ohio. Appreciation is expressed to Mr. M. W. Baker, under whose continuous supervision that service has expanded enormously in the 11 years since its establishment in Ohio in 1930. Acknowledgment is made also of assistance rendered by Frank M. Taylor and Hyman Leikind in tabulating and analyzing the data, and by many manufacturers in the State who cooperated generously in replying to inquiries.

MARKETING OHIO TOMATOES TO PROCESSORS ON GRADES, 1930-1940

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INTRODUCTION

United States grades for cannery tomatoes were first promulgated in tentative form by the United States Department of Agriculture in 1923. After some revision, the grades were used on a commercial scale by Ohio canners for the first time in 1930. The purchase of raw stock from growers on a graded basis and under government inspection has expanded very substantially and without interruption since that date, until now most canners of tomatoes and manufacturers of tomato products in the State use this method of buying from growers.

In 1932 the Ohio Agricultural Experiment Station published the results of a study of the marketing of cannery tomatoes (Bulletin 504, "Marketing Cannery Tomatoes on Grade in Ohio"). In addition to reporting on the use of official grades and government inspection, then employed for only 2 years by only a few Ohio tomato packers, that study was designed to determine, in so far as the limited data then available would permit, the relative value to the canner of the two acceptable grades of tomatoes, U. S. No. 1 and U. S. No. 2, in terms of both quantity and quality packed from each grade.

In 1935 another publication (mimeographed Bulletin No. 82, "Five Years of Cannery Tomato Inspection in Ohio, 1930-1934") was issued by the Department of Rural Economics of the Ohio Agricultural Experiment Station, recording the results of this method of marketing tomatoes to canners in Ohio during that period. In that report consideration was given to distribution of grades, number and location of factories and other receiving stations where tomatoes were bought on grades and inspection, and quantities and values of the tomatoes so purchased. Data have been furnished each year by the Federal-State Food Products Inspection Service in Ohio, under whose jurisdiction the inspection has been conducted.

It now seems desirable to record the results of 11 years of marketing Ohio tomatoes to processors on government grades and inspection, and to attempt an appraisal of the influence of this relatively new commercial practice on buyers and sellers. This report deals with grading and inspection of tomatoes at those plants where these functions were performed under the supervision of the Federal-State Food Products Inspection Service in Ohio. It deals essentially, though not exclusively, with the marketing of Ohio-grown tomatoes to processors in Ohio. At various times during this 11-year period, the Ohio service, for convenience and efficiency in administration, has had jurisdiction also (though temporarily) over four stations in Michigan and two stations in Indiana. In addition to the stations within Ohio, these stations in adjoining states, when under Ohio jurisdiction, are included in the data presented.

AN IMPORTANT INDUSTRY IN OHIO

The canning of tomatoes and the manufacture of tomato products in Ohio, though for many years industries of considerable magnitude, have grown within the last decade to a position of even greater size and economic importance than

before. The pack of canned tomatoes in the State averaged more than 1 million cases (24 No. 2 cans per case) annually in the 5 years 1935-1939, and in the last year of that period reached almost 1¾ million cases.

In terms of average production of canned tomatoes during those 5 years, Ohio ranked seventh; in 1939 the State ranked fourth. A recent issue of the Canners' Directory, published by the National Canners' Association, listed 56 firms in Ohio engaged in packing tomatoes or manufacturing tomato juice, pulp, purée, catsup, or other tomato products.

Many Ohio farmers, particularly in the northwestern part of the State, produce tomatoes for this trade. The crop is field grown, usually unstaked, and is harvested in August,. September, and October. Commercial plantings range from 1 or 2 acres to 20 or more, and constitute an important cash crop for many growers.

The number of acres planted specifically for marketing to processors has grown from less than 10,000 in 1933 to more than 23,000 in each of the 3 years 1938-1940. The volume produced for manufacture has more than doubled from 72,000 tons in 1933 to an average of 154,000 tons annually in the 3 years 1938-1940. The farm value of the crop likewise has increased, almost trebling from $674,000 in 1933 to an average of $1,734,000 annually in the 3 years 1938-1940.

BUYING PRACTICES OF PROCESSORS

Prior to 1930 all tomato processors operating in Ohio bought raw stock from growers at flat rates per ton. Prices were usually agreed upon in advance of planting. In this area open market purchases of tomatoes at harvest time are rare. It is general practice for buyers to enter into contracts with growers prior to planting, specifying acreage to be planted, prices to be paid, and other pertinent conditions. Almost without exception, flat-rate contracts specified delivery of sound, red-ripe tomatoes, without provision for acceptance of poorer tomatoes under any circumstances. The processor usually reserved the privilege of rejecting deliveries that failed to meet these specifications or of "docking" returns to the grower in proportion to the amount of unacceptable tomatoes delivered, though these terms rarely appeared in contracts. The buyer was the final judge of the acceptability of the tomatoes delivered.

In actual practice manufacturers often accepted tomatoes that failed to meet contract requirements. Interpretation of the terms "sound" and "red-ripe" was not always constant. When the crop was large, it was natural for the buyer to become more critical of the quality and maturity of the tomatoes delivered by growers. When the yield was small and the manufacturer found it difficult to secure enough tomatoes to meet his requirements, he might overlook inferior deliveries, and often did.

Acceptance of poor tomatoes at one time and insistence on high quality at another tended to destroy confidence, and business relationships suffered. Payment to all growers at the same rate per ton regardless of the quality delivered, likewise tended to discourage the better growers and resulted in indifferent harvesting and handling. The growers' principal objective became large tonnage, without regard to quality or maturity beyond the minimum of acceptability to the buyer. Processors constantly faced a difficult task in attempting to maintain quality.

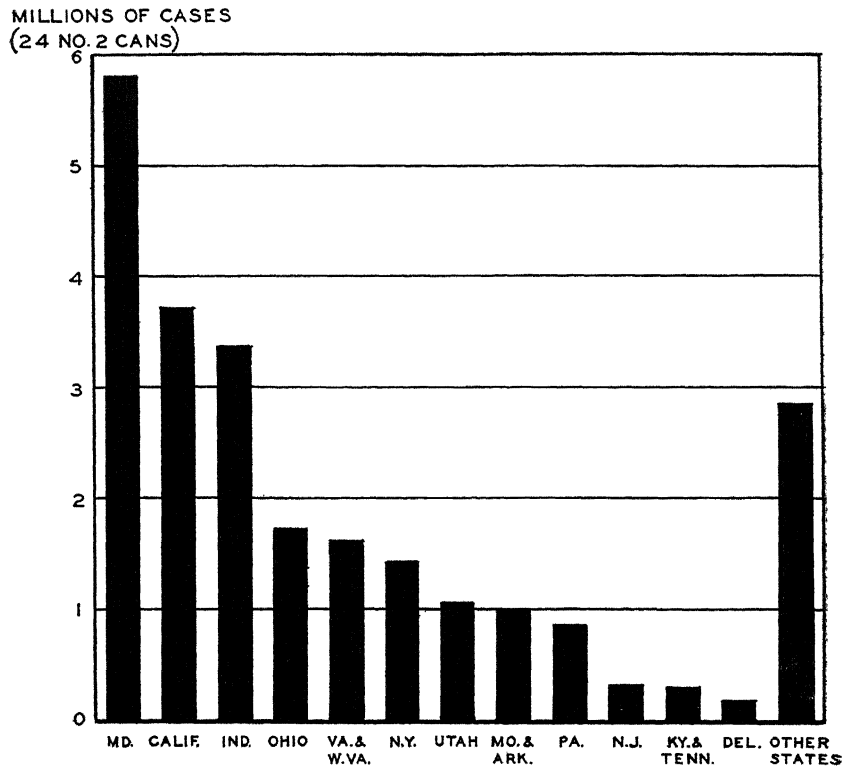

Fig. 1.—Ohio ranked fourth in production of canned tomatoes in 1939.

TABLE 1.—Tomatoes packed in the United States, 1935-1939*

State	Number of cases of 24 No. 2 cans (000 omitted)					
	1935	1936	1937	1938	1939	5-year average
Maryland	6,894	7,313	5,961	5,091	5,807	6,213
California	4,112	4,715	4,256	2,676	3,709	3,894
Indiana	3,587	3,010	3,642	3,037	3,376	3,330
Virginia and West Virginia	3,144	1,750	1,937	1,838	1,628	2,059
Missouri and Arkansas	1,594	98	2,646	2,828	987	1,631
New York	1,145	951	1,031	1,124	1,417	1,134
Ohio	841	841	864	1,375	1,729	1,130
Utah	725	1,209	1,124	855	1,053	993
Kentucky and Tennessee	1,160	552	961	799	302	755
Pennsylvania	531	779	446	600	850	641
Delaware	770	573	467	379	191	476
New Jersey	262	293	126	113	312	221
Other states	2,220	2,125	2,615	2,245	2,848	2,411
United States	26,985	24,209	26,076	22,960	24,209	24,888

*Source: Agricultural Statistics, Crop Reporting Board, Agricultural Marketing Service, 1940.

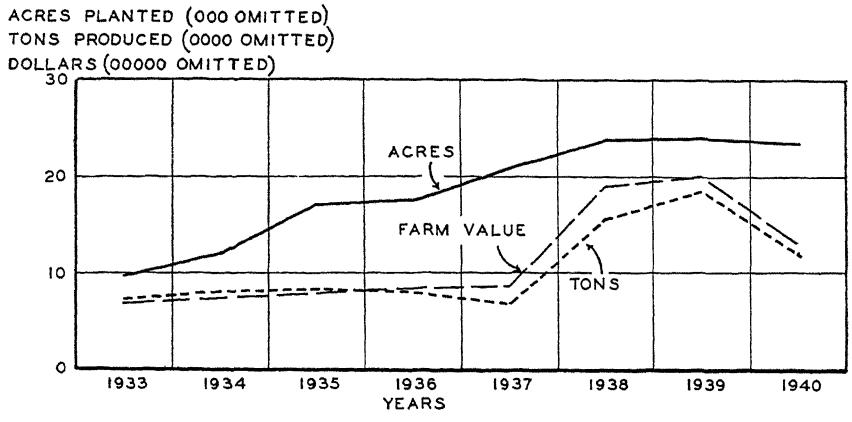

Fig. 2.—Production of tomatoes for manufacture in Ohio has increased.

TABLE 2.—Tomatoes for manufacture in Ohio, 1933-1940*

Year	Number of acres planted	Number of tons produced	Farm value
			Dollars
1933	9,800	72,500	674,000
1934	11,900	78,500	730,000
1935	17,000	81,600	792,000
1936	17,500	78,800	827,000
1937	21,000	69,300	866,000
1938	23,700	156,400	1,892,000
1939	24,000	184,800	1,996,000
1940	23,400	121,700	1,314,000
Average 1933-1940	18,537	105,450	1,136,000

*Source: Agricultural Statistics, Crop Reporting Board, Agricultural Marketing Service, December, 1940.

In 1930 United States grades for cannery tomatoes were adopted by five canners in Ohio as the basis for contracts with their growers. The grade of each load was determined by government inspection at time of delivery at the seven factories and receiving stations operated by these five manufacturers. Returns to growers were based on the proportionate amounts of each grade in the samples examined by the inspectors; substantially higher prices were paid for U. S. No. 1 grade than for U. S. No. 2 grade. No payment was made for culls, that is, tomatoes failing to meet the specifications of either of these two grades. Adoption of these official standards and employment of the government inspection service was, and still is, optional, dependent upon agreement of buyers and sellers.

In general this same procedure has been followed throughout the 11-year period 1930 to 1940, inclusive. Inspection has been provided continuously by joint action of the United States Bureau of Agricultural Economics (now Agricultural Marketing Service) and the Ohio Department of Agriculture. The

inspectors were employed, trained, and supervised by the Federal-State Food Products Inspection Service and were assigned to receiving stations where and when needed.

During the period of the inspectors' employment the manufacturers using the service paid to the Ohio Department of Agriculture an amount roughly equivalent to the salaries and expenses of the inspectors, who were in turn paid by that Department from the fund so collected. Costs of administration and supervision have been borne by the United States Department of Agriculture and the Ohio Department of Agriculture.

TOMATOES MARKETED ON GRADE AND INSPECTION

In the 11 years since adoption of federal grades and inspection by the five companies who pioneered in this movement in Ohio, this buying practice has been adopted by almost all tomato processors in this State, and in 1940 it was employed at 41 factories and other receiving stations, operated by 25 companies. The amount of tomatoes so purchased rose from 9,000 tons in 1930 to 139,000 tons in 1939, or more than 15 times the volume bought on grade the first year. Although because of a short crop in 1940, the volume dropped off to 96,000 tons, this still was materially greater than the volume in any year except 1939.

TABLE 3.—Cannery tomatoes marketed on federal grades and inspected under Ohio jurisdiction, 1930-1940*

Year	Number of companies	Number of stations	Quantity purchased	Payments to growers
			Thousands of tons	*Thousands of dollars*
1930	5	7	9.1	111.7
1931	12	14	18.1	169.1
1932	15	17	23.6	185.2
1933	15	18	26.6	232.6
1934	18	21	30.0	261.7
1935	27	33	48.7	466.5
1936	26	35	76.3	773.2
1937	28	45	47.5	533.2
1938	23	34	73.3	824.2
1939	23	36	138.9	1,468.4
1940	25	41	96.2	974.2
Total	.....	.. ..	588.3	6,000.0

*Source: Federal-State Food Products Inspection Service in Ohio.

The 41 stations where tomatoes were received by manufacturers on federal grades and inspected under Ohio jurisdiction in 1940 are located at: Bellevue, Bloomdale, Bowling Green, Bradford, Celina, Columbus Grove, Curtice (2), Delphos, Deshler, East Toledo (3), Fayette, Fremont, Genoa, Greenville, Mendon, Minster, Napoleon (2), New Carlisle, New Madison, Oak Harbor, Ohio City, Ottoville, Paulding, Plain City, Port Clinton, Rimer, Rockford, Sandusky (2), Swanton, Urbana, Van Wert, Wapakoneta (2), Wauseon, and Weston and Decatur, Indiana. These locations are shown in figure 3, together with locations of stations using inspection 1 or more years from 1930 to 1939, inclusive. It will be noted that almost without exception, these factories and receiving stations are in the western half of the State, with considerable concentration in the northwest quarter.

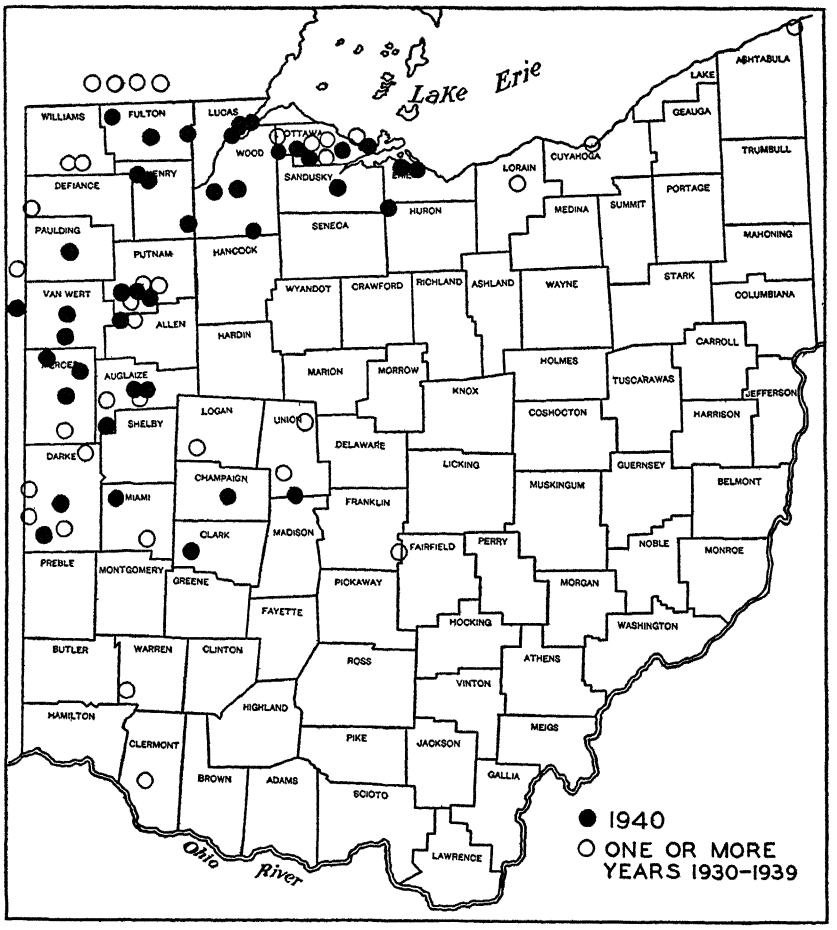

Fig. 3.—Stations where cannery tomatoes were purchased from growers on federal grades and inspection under Ohio jurisdiction, 1930-1940

In these 11 years tomatoes have been bought on federal grades and government inspection at 75 factories and other receiving stations in this territory, though not all these have operated continuously or bought on grades and inspection continuously. In figure 3 locations of the 41 stations operating under inspection in 1940 are shown in solid black. The 34 open circles show the locations of stations where cannery tomatoes were purchased from growers on federal grades and government inspection at some time or other during the years 1930 to 1939, inclusive, but where for one reason or another tomatoes were not so purchased in 1940. Each of these stations has arbitrarily been assigned a code number (1 to 75 inclusive) for purposes of identification throughout this bulletin.

With only two exceptions (1937 and 1940) the aggregate quantity marketed on grades exceeded that of the preceding year. The number of receiving stations where inspection was employed in each of these 2 years (45 in 1937 and 41 in 1940) was greater than in any other year during this period, but unfavorable growing conditions in those years were responsible for abnormally low

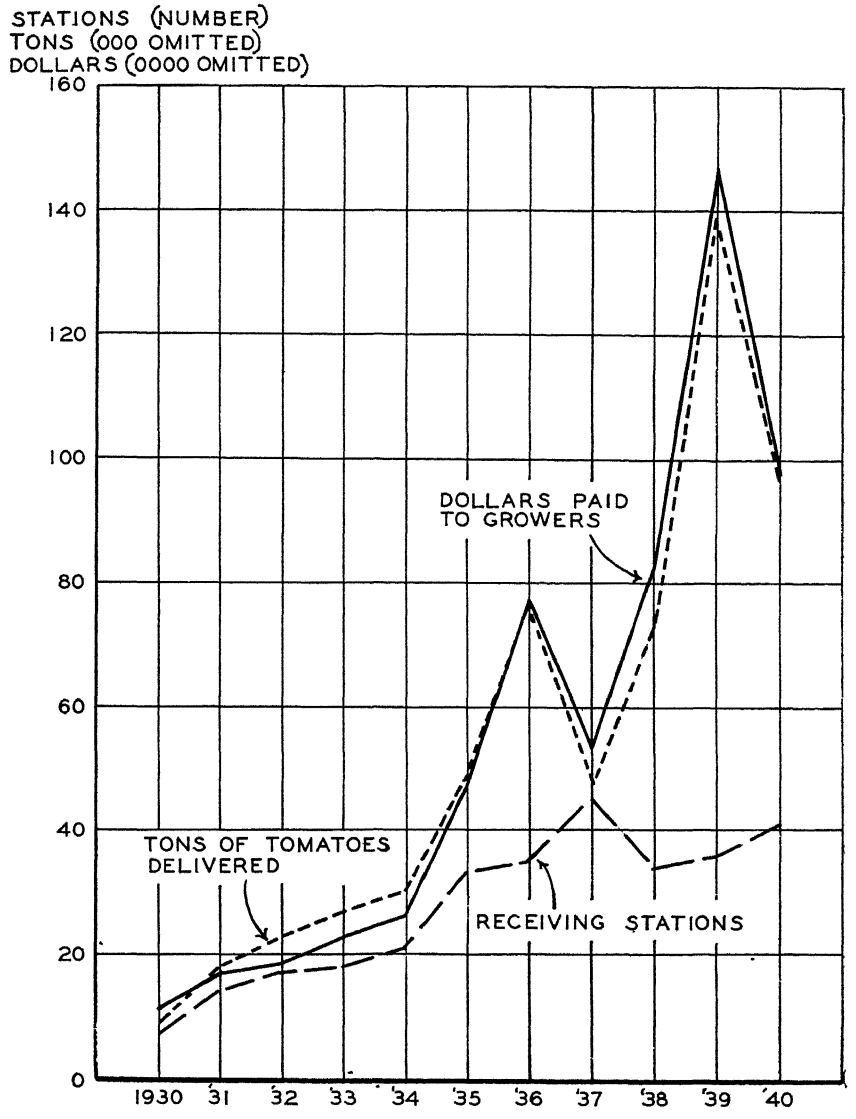

Fig. 4.—Cannery tomatoes marketed on federal grades and inspection under Ohio jurisdiction, 1930-1940; quantity, value, and number of receiving stations

yields and small deliveries. The quantity of tomatoes inspected in 1937 failed to reach quite the amount attained 2 years earlier, in 1935, when only 33 stations were buying on grades. In 1938 and 1939, however, consecutive annual increases in volume were resumed, and the increase in 1939 over 1938 was by far the greatest amount recorded in any year throughout this period. The decline in 1940 again was due to a short crop of cannery tomatoes in Ohio.

The spectacular increase in 1939 is traceable largely to the adoption of federal grades and inspection as the basis for purchase for the first time by one company with three large receiving stations which together accounted for 51,000 tons, or more than one-third of the total that year. These 3 stations and 2 others had a total tonnage almost equal to the entire amount received by 34 stations in 1938, and much more than by all 45 stations in 1937. One of these stations (No. 68) had a tonnage so large (25,000 tons) in that one year that it exceeded the aggregate tonnage for the entire period of all but five stations—No. 8, with 46,000 tons in 10 years; No. 17, with 41,000 tons in 9 years; No. 36, with 34,000 tons in 6 years; No. 37 with 47,000 tons in 6 years; and No. 56, with 26,000 tons in 4 years. The importance of relatively few stations is disclosed by the fact that these 6 stations had more than 40 per cent of the aggregate tonnage of all 75 stations for 11 years, and that 12 stations accounted for more than 60 per cent of the total.

TABLE 4.—Average quantity of cannery tomatoes marketed per station, 1930-1940*

Year	Quantity per station†	
	Tons	*Index (1930=100)*
1930	1,299.8	100
1931	1,292.0	99
1932	1,390.3	107
1933	1,479.3	114
1934	1,429.8	110
1935	1,475.0	113
1936	2,179.8	168
1937	1,055.7	81
1938	2,157.1	166
1939	3,857.9	297
1940	2,345.6	180

*Source: table 3.
†Arithmetic mean—total tons each year divided by number of stations that year.

A further measure of the change that has occurred since 1930 is to be found in the average number of tons per station in each year, as shown in table 4. The arithmetic mean of the tonnages received at the various stations each year rose from 1,300 tons in 1930 to 3,858 tons in 1939, an increase in average size of almost 200 per cent. Although a decline to 2,346 tons occurred in 1940, this was still the second largest average in the entire period, and almost twice as large as the averages in the first 2 years. It is evident that buyers of large volume have followed the lead of the relatively small pioneering companies.

Wide variations in conditions are reflected in the extreme range of tonnage from one station to another. The smallest quantity received by any station in any year was 26.5 tons by No. 20 in 1932, and the largest was 25,835.9 tons by No. 68 in 1939. The smallest tonnage in 1940 was received by No. 73, 221.6 tons, and the largest was received by No. 68, 15,341.8 tons.

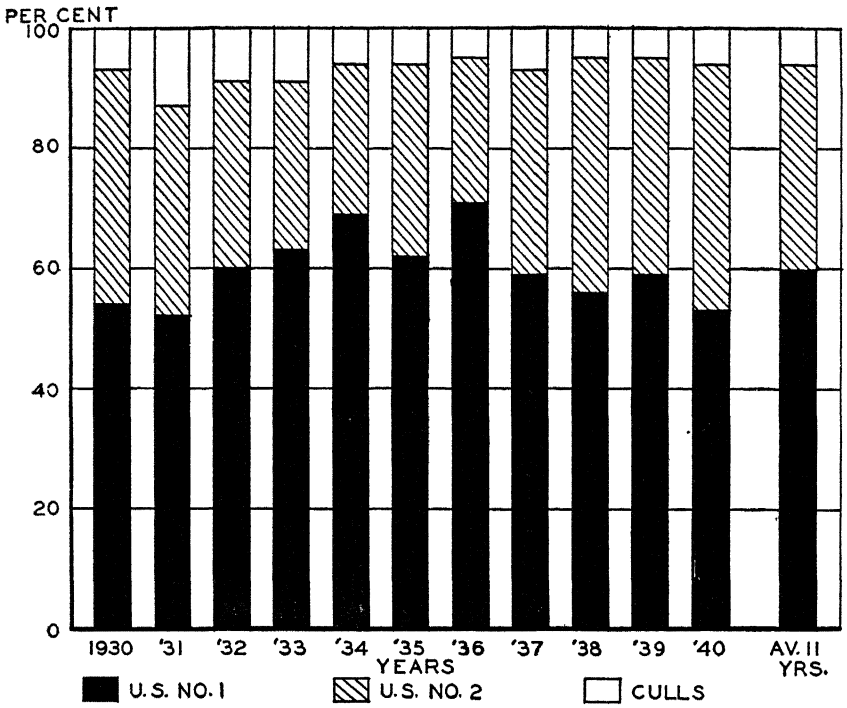

Fig. 5.—Percentage distribution of grades of cannery tomatoes inspected at stations under Ohio jurisdiction, 1930-1940

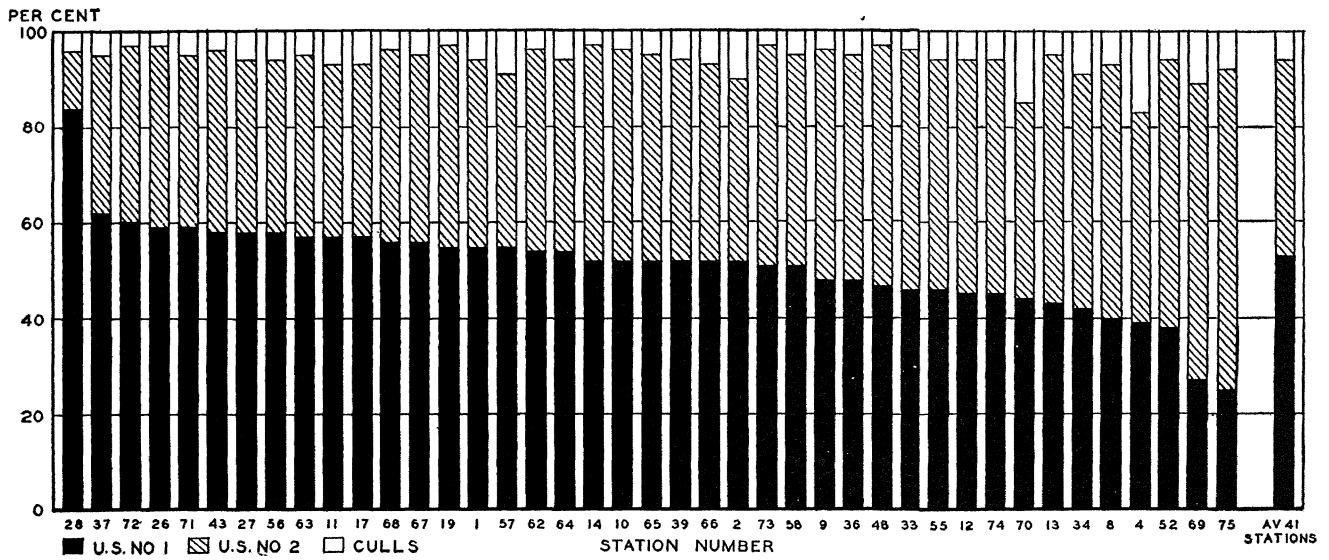

Fig. 6.—Percentage distribution of grades of cannery tomatoes inspected at 41 stations under Ohio jurisdiction, 1940

QUALITY OF TOMATOES INSPECTED

A complete description of the inspection process by which the quality of all tomatoes purchased by these processors was determined, is contained in Ohio Agricultural Experiment Station Bulletin 504, and need not be repeated here. Photographs of the equipment used and a facsimile of an inspection certificate covering one load of tomatoes accompany that description.

Copies of the United States grade specifications for tomatoes for canning and for manufacture of strained tomato products appear in the Appendix of this bulletin.

From 1930 to 1936 an almost constant increase occurred in percentages of U. S. No. 1 tomatoes delivered to these stations, but less favorable growing conditions were reflected in somewhat lower percentages of U. S. No. 1 tomatoes and higher percentages of U. S. No. 2 tomatoes in 1937, 1938, 1939, and 1940. Nevertheless, a sustained improvement in quality accompanying the use of grades throughout the 11-year period was discernible in the reduced percentages of culls. In 3 of the last 5 years of this period (1936, 1938, and 1939) culls averaged only 5 per cent, lower than in any of the other years, and only once (1937) in the last 7 years did culls exceed 6 per cent; whereas in the first 4 years (1930, 1931, 1932, and 1933) culls averaged 7, 13, 9, and 9 per cent, respectively. The difference reflects a substantial change in the care employed in harvesting and handling practices, and a proportionate increase in the percentages of U. S. No. 1 and U. S. No. 2 tomatoes, the only grades for which growers received payment.

TABLE 5.—Distribution of grades of cannery tomatoes inspected at stations under Ohio jurisdiction, 1930-1940*

Year	U. S. No. 1 Grade		U. S. No. 2 Grade		Culls		Total
	Tons	*Per cent*	*Tons*	*Per cent*	*Tons*	*Per cent*	*Tons*
1930	4,913.2	54	3,548.4	39	636.9	7	9,098.5
1931	9,371.4	52	6,483.1	35	2,233.5	13	18,088.0
1932	14,181.4	60	7,327.1	31	2,127.2	9	23,635.7
1933	16,599.8	63	7,443.0	28	2,584.6	9	26,627.4
1934	20,717.2	69	7,506.2	25	1,801.5	6	30,024.9
1935	29,960.5	62	15,740.2	32	2,975.5	6	48,676.2
1936	54,168.0	71	18,310.3	24	3,814.6	5	76,292.9
1937	27,948.8	59	16,382.4	34	3,174.6	7	47,505.8
1938	41,385.9	56	28,246.5	39	3,708.2	5	73,340.6
1939	82,214.6	59	50,386.6	36	6,284.2	5	138,885.4
1940	50,969.2	53	39,429.0	41	5,770.2	6	96,168.4
Total or average	352,430.0	60	200,802.8	34	35,111.0	6	588,343.8

*Source: Federal-State Food Products Inspection Service in Ohio.

Grade specifications and interpretations have remained unchanged[1] in any major respect throughout this period. Training and supervision of the inspectors have been under the direction of the same individuals,[2] and the administrative organization under which the inspection service is conducted has been uniform. Obviously, therefore, the decreased percentages of cull tomatoes reported represent an actual rather than fictitious improvement in quality and

[1]In 1938 color requirements in the grades for canning tomatoes were made identical with those in the grades for strained tomato products.

[2]Mr. M. W. Baker, supervising inspector.

are due to better understanding of grade requirements, better picking and handling by growers, and possibly also to the introduction of better strains and improvement of other cultural practices.

Opportunities still exist for improving quality. At certain factories the grade record is much better than at others, and the difference between the best and the poorest is so great that it is not to be accounted for wholly by differences in growing conditions. In 1940, for example, when the aggregate of deliveries to all 41 stations averaged 53 per cent U. S. No. 1, receipts at one station averaged 84 per cent No. 1's. Culls in 1940 averaged 6 per cent, yet at four stations culls averaged only 3 per cent. At the opposite extreme were three stations where receipts averaged not more than 40 per cent U. S. No. 1. At four stations culls averaged 9, 9, 10, and 17 per cent.

At certain stations the percentages of culls steadily declined over a period of several years, probably because of concerted effort on the part of management and growers. At station No. 19, for example, annual percentages of culls decreased from 1932 to 1939 (exclusive of 1934, when grade records at this station were incomplete) as follows: 14, 9, 6, 5, 4, 2, and 2, and increased only to 3 per cent in 1940. At station No. 52 culls declined in 4 years from 12 per cent in 1937 to 6 per cent in 1940. It would seem that constant diligence by all concerned might also improve the quality received at other stations.

RELATIONSHIP OF QUALITY TO SIZE OF PLANTING

Conceivably some measurable relationship exists between the acreage of tomatoes planted and the quality of the tomatoes harvested. The size of the area to be tended and the magnitude of the cultural and harvesting operations to be supervised by a given grower doubtless have some bearing on the proportions of U. S. No. 1 grade, U. S. No. 2 grade, and culls in his crop. Is there a tendency to better quality from large plantings or from small plantings? What sizes of planting should be encouraged if the objective is high quality?

So far as known, this question has not been subjected to scientific analysis. Opinions vary. One Ohio canner has expressed the conviction that "as a rule our larger growers are the ones who produce the best quality." Another has said, "Our experience shows the best quality is grown by the 2- and 3-acre growers. They give it their personal supervision. Larger growers must depend on hired labor, much of it transient, and the difficulties of supervision make it harder to grow good quality." Still another stated that "the size of the acreage planted by a tomato grower has little to do with quality. For instance, last year we had several growers who planted from 20 to 30 acres. On some of these large fields the crop was almost a complete failure, yet on others the crops yielded from 10 to as high as 18 tons per acre, of excellent quality."

Unfortunately, adequate records of individual plantings and quality scores of the deliveries of each grower at these plants are not available. To permit a dependable analysis of the relationships suggested would require more detailed information than is at hand. Nevertheless, such records as are available have been subjected to examination. Manufacturers have furnished for 36 receiving stations in 1939 the number of growers under contract and the aggregate number of acres of tomatoes planted by these growers. The percentages of U. S. No. 1 grade, U. S. No. 2 grade, and culls in the tomatoes delivered to each of these stations in 1939 are known from records of the Federal-State Food Products Inspection Service.

The average number of acres per grower was computed for each station, and these 36 items were paired with the corresponding percentages of U. S. No. 1 grade for purposes of statistical correlation. The relationship thus measured proved to be of only slight significance.[3] Although in general the higher percentages of U. S. No. 1 tomatoes were associated with the larger average acreages, yet the relationship was not pronounced enough to justify a sweeping conclusion that larger growers produce better tomatoes. As a matter of fact, when these average acreages were correlated with the percentages of salable tomatoes received at each station, that is, the sum of the percentages of U. S. No. 1 and U. S. No. 2 tomatoes, the relationship was found to be even more remote.[4]

It should be borne in mind that when averages such as these are considered, the individual variations in the data tend to become obscured. A satisfactory measurement is impossible without knowing the acreage and grade percentages of the tomatoes produced by each grower in a representative group. Records of this sort have been contributed by one of these processors and appear in table 6.

TABLE 6.—Classification of 76 tomato growers selling to one Ohio factory, by acres grown and percentages of U. S. No. 1 tomatoes delivered, 1939

Season average percentage of U. S. No. 1 grade	Number of growers									
	1	2	3	4	5	6	7	8	Total	
	Acres	*Acres*	*Acres*	*Acres*	*Acres*	*Acres*	*Acres*	*Acres*	*Number*	*Per cent*
80 or more	.....	1	.....	.....	.....	.....	.....	.....	1	1.3
75–79	1	2	.....	.....	.....	.....	.....	.....	3	3.9
70–74	1	2	1	.....	2	.....	.....	.....	6	7.9
65–69	.....	3	2	2	.....	.....	1	.....	8	10.5
60–64	3	6	6	4	2	2	.....	.....	23	30.3
55–59	.....	2	3	4	1	1	.....	1	12	15.8
50–54	2	3	2	3	1	1	1	1	14	18.5
45–49	.....	1	1	.....	.....	1	.....	.....	3	3.9
40–44	.....	.....	1	.....	.....	.....	1	.....	2	2.6
35–39	1	1	.....	.....	1	1	.....	.....	4	5.3
Total	8	21	16	13	7	6	3	2	76	100.0
Per cent	10.5	27.7	21.1	17.1	9.2	7.9	3.9	2.6	100.0	.....

It will be observed that of this small group of growers, none operated plantings larger than 8 acres; therefore, all plantings can be considered small to medium acreages. Only 11 were larger than 5 acres.

If the plantings of 3 acres or less are arbitrarily grouped into one classification and compared with those larger than 3 acres, it will be seen that 45 fall into the group of smaller acreages and 31 into the larger. In the first group 13, or 29 per cent, produced 65 per cent or more U. S. No. 1 grade, whereas in the second group 5, or only 16 per cent, produced that proportion of top quality tomatoes. Those producing less than 50 per cent U. S. No. 1's were almost identical in both groups—5, or 11 per cent, in the first and 4, or 13 per cent, in the second.

A slight tendency to better quality from the smaller acreages is apparent, but this observation also is inconclusive, owing to limitations of the sample. Data are needed from a larger number of growers, a wider area, and a longer period.

[3]The coefficient of correlation of these paired variables is +0.566.

[4]The coefficient of correlation of these paired variables is +0.429.

PRICES AND VALUES

Owing to the steadily increasing volume of tomatoes purchased on grade by processors in this area, the total annual value to growers of tomatoes so purchased has risen in recent years to much higher levels than in the first few years of this period. By 1939 the value had reached the unprecedented sum of 1½ million dollars, about twice as much as in the highest preceding years, 1936 and 1938, and more than 13 times as much as in 1930. In 1940, owing to declines in volume and in the average price per ton, the value dropped to a little short of 1 million dollars.

TABLE 7.—Prices and values to growers of tomatoes bought on United States grades at stations under Ohio jurisdiction, 1930-1940*

Year	Total value to growers			Weighted average price per ton†		
	Dollars	*Indexes* (1930=100)	*Indexes* (Average 1930-1934 =100)	*Dollars*	*Indexes* (1930=100)	*Indexes* (Average 1930-1934 =100)
1930	111,672.42	100	58	12.27	100	131
1931	169,071.84	151	88	9.35	76	100
1932	185,176.54	166	96	7.83	64	83
1933	232,582.54	208	121	8.73	71	93
1934	261,685.04	234	136	8.72	71	93
1935	466,455.81	418	243	9.58	78	102
1936	773,201.49	692	403	10.13	83	108
1937	533,152.60	477	278	11.22	91	120
1938	824,182.79	738	429	11.24	92	120
1939	1,468,422.71	1,315	765	10.57	86	113
1940	974,183.63	872	507	10.13	82	108
Total or average 1930–1940	5,999,787.41	.....	.....	10.20	83	109

*Source: Federal-State Food Products Inspection Service in Ohio.
†Aggregate value divided by aggregate number of tons delivered (including culls).

Prices to growers have not been uniform. At no other time throughout this 11-year period has the weighted average price per ton of tomatoes been as high as in 1930. A precipitous decline in prices occurred from 1930 to 1932, until in the latter year the weighted average price per ton for all tomatoes sold on United States grades in this area was less than two-thirds as high as in 1930. Following 1932 slow but steady recovery took place to and including 1938, and despite further recessions in 1939 and 1940, prices appear to have leveled off, at least temporarily, at 10 to 20 per cent below the 1930 level.

Not only have prices lacked uniformity from year to year, but wide variations have also existed among prices paid by different companies and at different stations by the same company. In 1930, for example, prices for U. S. No. 1 tomatoes ranged from $14 to $18 a ton, and for U. S. No. 2 tomatoes from $8 to $12 a ton. In 1940, after 11 years of this method of buying and selling, prices varied even more widely than in 1930, or from $11 to $17 per ton for No. 1's and from nothing to $8 for No. 2's. The opportunity for variation, of course, was much greater in 1940 because of the larger number of buyers.

In addition to this wide variability in actual prices, great differences have existed in the relationships between prices paid for U. S. No. 1 tomatoes and U. S. No. 2 tomatoes. A few buyers have paid as much for No. 2's as for No. 1's (station No. 8 in 1931, and Nos. 5, 22, 31, and 51 in 1937). One paid for No. 2's as little as 40 per cent of the No. 1 price (station No. 24, in 1938), and

another (station No. 28, in 1940) paid nothing for No. 2's. Some buyers have lacked a consistent policy in this respect, altering their price ratios materially from year to year. At station No. 5, for instance, where after 7 years during which prices paid for U. S. No. 2 grade were from 44 to 60 per cent of the U. S. No. 1 price, suddenly in 1937 the price for No. 2's was raised to equality with that paid for No. 1's. At station No. 31, in 3 years of operation under this buying plan, the ratio of the No. 2 price to the No. 1 price ranged from a low of 57 per cent to a high of 100 per cent. At station No. 28 in 6 years the price ratios varied as follows: 67, 50, 57, 67, 67, and 0.

The high ratios at a few stations in 1937 possibly may be explained by the unfavorable growing conditions in that year, which caused unusually active competition among buyers for the available supplies. For the purpose of maintaining the good will and continued patronage of growers, there was apparent in that season a disposition in some quarters to compensate for uncommonly high percentages of U. S. No. 2 tomatoes and culls by departing at picking time from the contractual terms and raising the price paid for No. 2 grade. In a few cases this practice amounted to a temporary abandonment of the principle of graduated prices based on quality distinctions.

Either the physical conditions under which cannery tomatoes are grown are extremely diverse from one of these stations to another (doubtful in so limited an area) or from year to year, or the competitive conditions under which the tomatoes are marketed are very different, or, as seems more likely, buyers and sellers have not yet agreed upon what constitutes a reasonable and equitable price level or ratio between prices for the two acceptable grades.

The majority of the canners have paid for U. S. No. 2 tomatoes from 50 to 60 per cent of the U. S. No. 1 price. Of the 299 price ratios observed at these stations in this 11-year period, 173 (about 58 per cent) represented prices for No. 2's that were from 50 to 60 per cent (both inclusive) of the corresponding No. 1 prices. Yet in 1940, 21 of the 41 contractual ratios observed specified a price for No. 2's less than half the accompanying price for No. 1's. These 21 constituted more than 51 per cent of all the price ratios observed in that year, exceeding the number and proportion in any previous year. Moreover, in 1940 only 2, or less than 5 per cent, of the 41 contractual ratios observed provided for prices for No. 2's higher than 60 per cent of the accompanying prices for No. 1's. Whether these ratios indicate a growing tendency to pay proportionately less for U. S. No. 2 tomatoes than has been customary is not yet clear.

Another proposed plan for payment for graded tomatoes is said to have been employed to a limited extent elsewhere, but to date has not been adopted except experimentally in this area. This proposal involves payment of a relatively high price (for example $20 or more per ton) for U. S. No. 1 grade, and no payment whatever for lower grades. This plan was used in 1940 at station No. 28, where U. S. No. 1's were purchased at $16 a ton, and No. 2's and culls were not paid for. Advocates of this method of payment consider it a practicable and equitable means of encouraging deliveries of higher quality, paying the grower a reasonable return proportionate to the quality delivered and at the same time guaranteeing to the canner that he will have a minimum of low-grade tomatoes to handle, that his raw stock will be such as to enable him to produce a high-grade finished product, and that in no event will he be required to pay for low grades. This plan of payment possibly will receive further experimentation in the future. Considerable experience with it would seem to be necessary to determine what price level would be the most satisfactory compromise to buyers and sellers.

A few manufacturers offered a premium (usually $2 more per ton than the contract price) for U. S. No. 1 tomatoes delivered before September 1, to encourage earlier deliveries and to induce growers to adopt better cultural and handling practices for the purpose of improving the quality of the stock delivered during the early part of the canning season. Another premium plan provided that in addition to the basic contract prices, a bonus of $2 per ton for U. S. No. 1 tomatoes was paid to those growers whose deliveries averaged 70 per cent U. S. No. 1 or more during the season, and that a bonus of $1 a ton for No. 1's was paid to those growers whose deliveries averaged 65 per cent, but less than 70 per cent, No. 1's during the season.

TABLE 8.—Ratios* of prices paid for graded tomatoes at stations under Ohio jurisdiction, classified by magnitude, 1930-1940

Year	Number of observed ratios†	Lowest ratio observed	Highest ratio observed	Ratios* lower than 50 per cent		Ratios* from 50 per cent to 60 per cent, inclusive		Ratios* higher than 60 per cent	
		Per cent	*Per cent*	*Number*	*Per cent of total*	*Number*	*Per cent of total*	*Number*	*Per cent of total*
1930....	7	55	67	.....	.....	5	71.4	2	28.6
1931....	14	43	100	2	14.3	8	57.1	4	28.6
1932....	17	44	67	7	41.2	9	52.9	1	5.9
1933....	18	44	69	2	11.1	14	77.8	2	11.1
1934....	19	43	76	2	10.5	15	79.0	2	10.5
1935....	33	42	67	5	15.1	19	57.6	9	27.3
1936....	35	43	67	4	11.4	27	77.2	4	11.4
1937....	45	43	100	10	22.2	20	44.5	15	33.3
1938....	34	40	67	7	20.6	23	67.6	4	11.8
1939....	36	42	67	15	41.7	15	41.7	6	16.6
1940....	41	0	67	21	51.2	18	43.9	2	4.9
Total..	299	0	100	75	25.1	173	57.8	51	17.1

*Each ratio is the price per ton of U. S. No. 2 tomatoes at a given station expressed as a percentage of the price per ton of U. S. No. 1 tomatoes at that station.

†Equivalent to number of factories and other receiving stations where tomatoes were purchased on U. S. grades and government inspection.

Prices used in calculating the ratios recorded in table 8 are contract prices, usually agreed upon prior to planting. Although in some instances prices later were modified, it was these contract prices that were paid for practically all the tomatoes delivered to the various stations. Values to growers reported here have been computed by applying the contract prices to the quantities of each grade delivered at each station each year. Quantities entitled to various premium or bonus payments are not known; therefore these computed values doubtless will not agree exactly in every case with amounts actually paid to growers. They should, therefore, be interpreted only as close approximations, rather than exact payments for the tomatoes purchased at each of these stations in the respective years.

During these 11 years the market for canned tomatoes in the United States fluctuated about as widely as contract prices of raw tomatoes in Ohio. A reasonably accurate measure of the price level of canned tomatoes can be found in the lowest spot price per dozen No. 2 cans of standard tomatoes reported in the United States each January and July. Indexes of these prices, based on the arithmetic mean of the quotations from January 1930 to and including July 1934, ranged from a high of 120 in January 1930 to a low of 73 in January 1933, or an extreme range of 47 points. Indexes of weighted average prices per ton

of raw stock based on the arithmetic mean of the quotations during the same 5-year period, ranged from a high of 131 in 1930 to a low of 83 in 1932, or an extreme range of 48 points.

It will be noted, however, that the prices of raw stock and of the finished product have not fluctuated together. Whereas the prices of raw stock dipped abruptly from the highest point in these 11 years in 1930 to the lowest point 2 years later, and then recovered gradually with only slight recessions in 1939 and 1940, the prices of canned tomatoes declined somewhat more slowly, reaching the lowest point early in 1933, and then after a quick recovery dropped off again to a level in 1939 and 1940 almost as low as that of 1933. During the 5 years 1936 to 1940, inclusive, the spread between buying prices and selling prices has been less advantageous to the canner than in the earlier years of this period.

TABLE 9.—Prices of raw tomatoes at stations under Ohio jurisdiction and United States prices of canned tomatoes, 1930-1940

Year and month	Raw stock		No. 2 cans of standard tomatoes	
	Ohio price per ton*		U.S. spot price per dozen‡	
	Dollars	*Index† (Average 1930-1934=100)*	*Cents*	*Index§ (Average 1930-1934=100)*
1930:				
January			90	120
July	12.27	131	87½	116
1931:				
January			70	93
July	9.35	100	67½	90
1932:				
January			70	93
July	7.83	83	82½	110
1933:				
January			55	73
July	8.73	93	70	93
1934:				
January			77½	103
July	8.72	93	82½	110
1935:				
January			82½	110
July	9.58	102	85	113
1936:				
January			65	86
July	10.13	108	62½	83
1937:				
January			67½	90
July	11.22	120	67½	90
1938:				
January			65	86
July	11.24	120	62½	83
1939:				
January			59	79
July	10.57	113	60	80
1940:				
January			59	79
July	10.13	108	60	80

*Average prices to growers at Ohio factories buying on U. S. grades and inspection, weighted by quantities of each grade bought. Source: table 7.
†Average 1930-1934=$9.38.
‡Lowest prices of spot tomatoes. Source: The Almanac of the Canning Industry.
§Average January 1930—July 1934=75 cents.

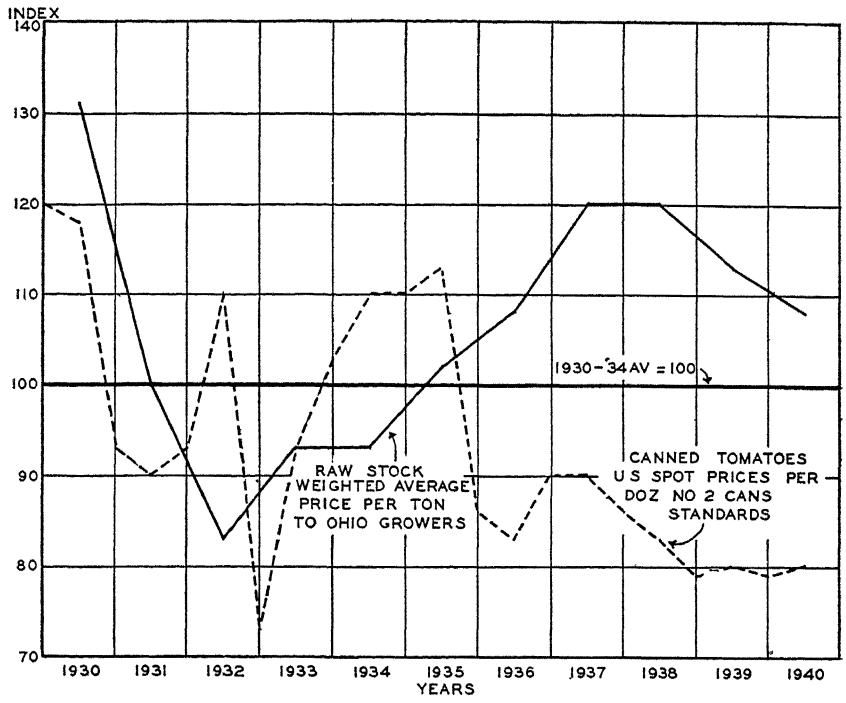

Fig. 7.—Indexes of prices of raw and canned tomatoes, 1930-1940

This changed relationship in prices may or may not reflect a change in the relationship of costs and returns to the manufacturer. Any disadvantage suffered by the canner through rising prices for raw stock and declining prices for finished goods may have been compensated by quantitative or qualitative gains in yields per ton, or by reductions in manufacturing costs or selling expenses. No attempt is made here to measure the influences of various factors which might have participated in altering the relationships of buying and selling prices; but the opinion may be hazarded that the more important of these influences would be found among the following: the quantities of finished goods packed from a given amount of raw stock in recent years as compared with earlier years; the proportions of high-quality merchandise and of waste yielded by tomatoes bought on grade as compared with those bought at flat rates; changes in canners' labor costs; technological improvements; competitive forces in the market. Whatever the cause and whatever the effect upon profits of Ohio canners, it is apparent that in the last few years these canners have paid to tomato growers higher prices in proportion to selling prices than during the earlier years of this period, before purchasing on the graded basis became general.

SUMMARY AND RECOMMENDATIONS

The canning of tomatoes and the manufacture of tomato products in Ohio are important and growing industries. The pack of canned tomatoes in the State averaged more than 1 million cases annually in the 5 years 1935-1939, and in the last year of that period reached almost 1¾ million cases.

In 1939 Ohio ranked fourth in the production of canned tomatoes, exceeded only by Maryland, California, and Indiana.

The number of acres of tomatoes grown for manufacture in the State more than doubled from 1933 to 1940. Tonnage produced likewise more than doubled, and farm value almost trebled in that 8-year period. In 1940, 23,400 acres were planted, and 121,700 tons were produced, with a farm value of $1,314,000.

In the 11 years since the adoption of federal grades and government inspection of cannery tomatoes by the five packing companies who pioneered this movement in Ohio, this buying practice has been adopted by almost all tomato canners in the State and by many companies manufacturing other tomato products. In 1940 it was employed at 41 factories and other receiving stations operated by 25 companies. The amount of tomatoes so purchased from Ohio growers rose from 9,000 tons in 1930 to 139,000 tons in 1939, or to more than 15 times the volume bought on grade the first year, though because of a short crop in 1940 the volume dropped off to 96,000 tons.

With only two or three exceptions, the factories and receiving stations using this buying practice are in the western half of the State, with considerable concentration in the northwest quarter. In that part of Ohio field-grown tomatoes, grown principally under contract for delivery to canners, constitute an important cash crop for many farmers.

Gross returns to growers from the sale of graded tomatoes to processors during these years have aggregated approximately $6,000,000, ranging from a low of $111,000 in 1930 to a high of $1,468,000 in 1939.

The grade of each load is determined by government inspection at time of delivery. Returns to growers are based on the proportionate amounts of each grade in the samples examined by the inspectors. Substantially higher prices are paid for U. S. No. 1 grade than for U. S. No. 2 grade. No payment is made for culls, that is, tomatoes failing to meet the specifications of either of these two grades.

Prices to growers have not been uniform. The weighted average price per ton has varied from a high of $12.27 in 1930 to a low of $7.83 in 1932. Prices for U. S. No. 1 tomatoes in 1940 ranged from $11 to $17 a ton and for U. S. No. 2's from nothing to $8 a ton. Various bonus and premium plans have been tried as inducements to better quality.

Although in general, quality has improved during this period, opportunity for further improvement still exists. Inspection at receiving stations during these 11 years has been provided, at the request of manufacturers, by joint action of the United States Bureau of Agricultural Economics (now Agricultural Marketing Service) and the Ohio Department of Agriculture. Inspectors are employed, trained, and supervised by this inspection service and are assigned to receiving stations where and when needed. Most of the cost of this service is covered by the inspection charges paid by the various users of the service. Adoption of these official standards and employment of the Federal-State Inspection Service was, and still is, optional, dependent upon agreement of buyers and sellers.

Insufficient data are available to determine whether there is a tendency to better quality from large plantings or from small plantings, or to indicate what sizes of planting should be encouraged if the objective is high quality.

In an earlier study by the Ohio Agricultural Experiment Station[5] the conclusion was reached that under conditions prevailing in 1930 and 1931, the marketing of tomatoes to processors on official grades and government inspec-

[5]Bulletin No. 504, "Marketing Cannery Tomatoes on Grade in Ohio."

tion resulted in higher gross returns to growers; lower labor costs and higher net returns to processors; improved quality and larger volume of finished products per ton of raw stock; and more equitable relationships between growers and processors.

Whether these conclusions would be confirmed by further investigation at this later date is not known. Yet the gradual growth of the relatively new buying practice described indicates that processors of tomatoes in Ohio have concluded almost unanimously that the practice is beneficial to the purchaser. Usually the manufacturer's method of supplying his raw stock needs is determined to a greater extent by the purchaser than by the growers from whom he buys. Moreover, he has more direct measures of the advantages and disadvantages of whatever method is used.

More study is needed to determine the economic effects of this marketing method on growers of cannery tomatoes. At the time of the earlier inquiry it was recognized that higher prices and higher gross returns to growers do not necessarily indicate higher net returns at the farm. The costs of harvesting and handling the crop when delivery is made on a graded basis may be enough higher than when delivery is made on the so-called flat-rate basis that the grower may be no better off, or may, perhaps, be even worse off financially than before.

As operated on cannery tomatoes, the determination of grade is made by a process of sampling upon arrival at the receiving station, and sorting before delivery is not contemplated. In practice, however, some growers find it desirable at times to grade out cull tomatoes before delivery. Moreover, the grower who seeks to supply tomatoes containing high proportions of U. S. No. 1 grade and few or no culls must do some sorting or selecting. He must exercise care in picking and handling. Pickers must leave on the vines those tomatoes which have not yet fully ripened. They must leave on the vines or on the ground tomatoes which for any reason fall below the specifications of U. S. No. 2 grade. More frequent pickings over a given field are required. Harvesting is slower. Whether tonnage of salable tomatoes is thereby reduced or increased is not known. Data on harvesting costs and grading costs (if any) are not available. So far as is known, no research has been conducted in this phase of the subject either by the Federal Government or by any of the state experiment stations, nor are there any known reliable records kept by individual growers or by canners. In short, the economic significance to growers of this relatively new marketing practice cannot be evaluated fully and accurately on the basis of the partial information at hand. Further research is needed.

Despite inadequacy of the information available on certain aspects of this method of marketing tomatoes, it can be appraised in general as a decided improvement over the former flat-rate method. Standardization is encouraged. Unbiased and accurate evaluation of the goods delivered is assured. Payment is proportionate to quality, and this relationship promotes better cultural and handling practices, reduces deliveries of low-grade tomatoes, and permits economies in handling and in manufacture.

Further extension of the plan is recommended, but greater uniformity in rates of payment seems desirable. It would appear that the entire matter of schedules of payment is one that ought to be subjected to careful study jointly by growers and processors.

The economic effect on the grower has not yet been thoroughly examined. Until this has been studied, a wholly reliable evaluation of the plan is impossible.

APPENDIX

U. S. Standards for Canning Tomatoes, 1938

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE*

U. S. STANDARDS FOR CANNING TOMATOES (1938)

These standards are revised at this time so as to expand and clarify the definitions of "well colored" and "fairly well colored." Since the interpretation of these definitions has been the same in the U. S. Standards for Canning Tomatoes issued in 1926 and the U. S. Standards for Tomatoes for Manufacture of Strained Tomato Products issued in 1933, it is thought that wording the definitions alike in both sets of standards will clarify any misunderstandings which may have existed.

Grades for canning tomatoes which will provide a definite basis for contracts between the canner and the grower are meeting with increasing favor. Such grades must recognize variations in commercial value and still be simple enough to be practical in actual operations.

It should be understood at the outset that the only grading required of the grower is the removal of Culls. Such tomatoes should be left in the field. It is not intended that the grower sort the tomatoes into No. 1 and No. 2 grades. The proposed grades provide a basis for sampling the tomatoes as they are delivered to the cannery.

The application of these grades requires the services of private or official inspectors to determine the amounts of each grade in the various loads of tomatoes. Such inspectors must be capable, efficient, and above all they must be absolutely neutral. The inspectors reports should show the percentages of U. S. No. 1, U. S. No. 2, and Cull tomatoes.

Buying and selling on grade will encourage better production and better handling. The practice of paying a flat price for everything which is accepted, discriminates against the best growers. The grower should be paid a suitable premium for stock of high quality which will make a high quality manufactured product. Such stock can be canned at a minimum cost. On the other hand there should be suitable penalties for the delivery of culls.

*This is a reissue of U. S. Standards for Canning Tomatoes which were effective December 31, 1938, formerly issued by the Bureau of Agricultural Economics. No change is made in the text of the Standards.

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

U. S. STANDARDS FOR CANNING TOMATOES (1938)

(Effective December 31, 1938)

GRADES

U. S. No. 1 shall consist of tomatoes which are firm, ripe, well colored, well formed; free from molds and decay and from damage caused by growth cracks, worm holes, catfaces, sunscald, freezing injury, or mechanical or other means. (See minimum size)

U. S. No. 2 shall consist of tomatoes which do not meet the requirements of the foregoing grade but which are ripe and fairly well colored and which are free from serious damage from any cause. (See minimum size)

Culls are tomatoes which do not meet the requirements of either of the foregoing grades.

MINIMUM SIZE

The *minimum size* may be fixed by agreement between buyer and seller. Tomatoes below this specified minimum size shall be classed as Culls.

DEFINITIONS OF TERMS

As used in these standards:

"Firm" means that the tomato is not soft, puffy, shriveled or water soaked.

"Well colored" means that at least 90 per cent of the flesh of the tomato has *good red* color, provided that a tomato having flesh of a lighter shade of red shall be considered as "well colored" if enough additional area of the flesh has a shade of red color so that the tomato has a sufficient amount of red to be equivalent in color to that of a tomato which has 90 per cent good red color.

"Fairly well colored" means that at least two-thirds of the flesh of the tomato has *good red* color, provided that a tomato having flesh of a lighter shade of red shall be considered as "fairly well colored" if enough additional area of the flesh has a shade of red color so that the tomato has a sufficient amount of red to be equivalent in color to that of a tomato which has two-thirds *good red* color.

"Well formed" means that the tomato shall not be extremely flat or otherwise badly misshapen.

"Damage" means any injury which cannot be removed in the ordinary process of trimming and peeling without a loss of more than 10 per cent (by weight) of the tomato in excess of that which would occur if the tomato were perfect.

"Serious damage" means any injury which cannot be removed in the ordinary process of trimming and peeling without a loss of more than 20 per cent (by weight) of the tomato in excess of that which would occur if the tomato were perfect.

Issued December 15, 1938.
Reissued July 10, 1939.

U. S. Standards for Tomatoes for Manufacture of Strained Tomato Products

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE*

U. S. STANDARDS FOR TOMATOES FOR MANUFACTURE OF STRAINED TOMATO PRODUCTS

GRADES

U. S. No. 1 shall consist of tomatoes which are fairly firm, ripe, well colored, and free from stems and from damage caused by badly discolored cracks, shriveling, molds, decay, sunburn, sunscald, freezing or other means.

U. S. No. 2 shall consist of tomatoes which do not meet the requirements of the foregoing grade but which are ripe and fairly well colored and which are free from serious damage from any cause.

Culls are tomatoes which do not meet the requirements of either of the foregoing grades.

DEFINITIONS OF TERMS

As used in these grades:

"Fairly firm" means that the tomato is not water soaked.

"Well colored" means that at least 90 per cent of the flesh of the tomato has *good red* color, provided that a tomato having flesh of a lighter shade of red shall be considered as "well colored" if enough additional area of the flesh has a shade of red color so that the tomato has a sufficient amount of red to be equivalent in color to that of a tomato which has 90 per cent *good red* color.

"Fairly well colored" means that at least two-thirds of the flesh of the tomato has *good red* color, provided that a tomato having flesh of a lighter shade of red shall be considered as "fairly well colored" if enough additional area of the flesh has a shade of red color so that the tomato has a sufficient amount of red to be equivalent in color to that of a tomato which has two-thirds *good red* color.

"Damage" means any injury which appreciably affects the quality of the tomato for pulping. Any one of the following defects or any combination of defects which exceeds the maximum allowed for any one defect shall be considered as damage:

(a) Molds or decay, except that molds or very slight decay which can be removed in the ordinary process of washing without hand trimming shall not be considered as damage.

(b) Sunburn or sunscald which cannot be removed in the ordinary process of trimming without a loss of more than 10 per cent, by weight, of the tomato in excess of that which would occur if the tomato were perfect.

(c) Tomatoes which show an appreciable amount of shriveling.

*This is a reissue of U. S. Standards for Tomatoes for Manufacture of Strained Tomato Products which were effective March 1, 1933, formerly issued by the Bureau of Agricultural Economics. No change is made in the text of the Standards.

"Serious damage" means any injury which severely affects the quality of the tomato for pulping. Any one of the following defects or any combination of defects which exceeds the maximum allowed for any one defect shall be considered as serious damage:

(a) Decay which has caused the tomato to become sour, or decay or disease, such as Anthracnose spots, Blossom-end Rot, Soil Rot, or any other decay or disease which cannot be removed in the ordinary process of trimming without a loss of more than 20 per cent, by weight, of the tomato in excess of that which would occur if the tomato were perfect.

(b) Sunburn or sunscald which cannot be removed in the ordinary process of trimming without a loss of more than 20 per cent, by weight, of the tomato in excess of that which would occur if the tomato were perfect.

(c) Shriveling when the flesh of the tomato is tough and rubbery.

Issued March 1, 1933.
Reissued August 25, 1939.